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(54)【発明の名称】　部分データ同期化方法および携帯型情報機器

(57)【要約】

【課題】携帯型情報機器の保持する部分データを非携帯型情報機器の保持するフルセットのデータに同期化する際の新規な方法を提供する。

【解決手段】携帯型情報機器において、データの参照（利用）に先立ち、携帯型情報機器において行われた各データ項目の参照に関するデータ参照履歴情報を非携帯型情報機器に転送する。非携帯型情報機器では、フルセットのデータに関する、携帯型情報機器でのデータ参照履歴情報に基づいて、前記フルセットのデータのうちの部分データを抽出し、この部分データを携帯型情報機器へ転送する。

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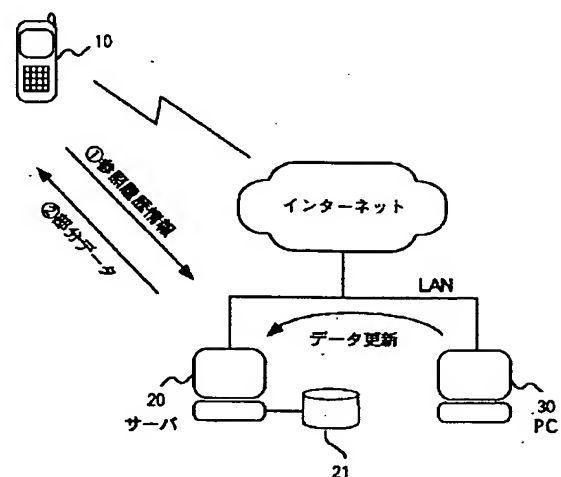
【特許請求の範囲】
【請求項１】非携帯型情報機器に格納されているフルセットのデータの一部を携帯型情報機器へ転送する部分データ同期化方法であって、
携帯型情報機器において行われた各データ項目の参照に関するデータ参照履歴情報を非携帯型情報機器に転送し、
非携帯型情報機器では、フルセットのデータに関する、携帯型情報機器でのデータ参照履歴情報に基づいて、前記フルセットのデータのうちの部分データを抽出し、
当該部分データを非携帯型情報機器から携帯型情報機器へ転送することを特徴とする部分データ同期化方法。
【請求項２】前記非携帯型情報機器において、前記フルセットのデータの各データ項目について、それが最後に参照された日時を含む参照履歴情報を更新・管理し、前記部分データとして、最近参照されたデータ項目から優先的に抽出する請求項１記載の部分データ同期化方法。
【請求項３】前記非携帯型情報機器において、前記フルセットのデータの各データ項目について、過去の代表的な参照時間間隔と最後に参照された最新参照時刻とを含むデータ参照履歴情報を更新・管理し、
各データ項目について、前記時間間隔および最近参照時刻に基づいて次に参照される時刻を予測し、
前記部分データとして、前記複数のデータ項目のうち予測された時刻が現在に近いものから優先的に抽出することを特徴とする請求項１または２記載の部分データ同期化方法。
【請求項４】各データ項目について、次式により、予め定められた指標値RefDis(Di,t)を算出し、
$$RefDis(Di,t) = abs(T(Di) + I(Di) - t)$$
（ここに、”Ｔ（Ｄｉ）”および”Ｉ（Ｄｉ）”は、それぞれ、データ項目Ｄｉについての最後の参照時刻と、最近の所定回数の代表的な参照時間間隔である）前記式により計算される指標値RefDis(Di,t)を基に、各データ項目の次に参照される時刻を予測することを特徴とする請求項３記載の部分データ同期化方法。
【請求項５】非携帯型情報機器に格納されているフルセットのデータの一部を携帯型情報機器へ転送する部分データ同期化方法を実現するためのコンピュータプログラムを格納した記録媒体であって、
携帯型情報機器において行われた各データ項目の参照に関するデータ参照履歴情報を非携帯型情報機器に転送するステップと、
非携帯型情報機器では、フルセットのデータに関する、携帯型情報機器でのデータ参照履歴情報に基づいて、前記フルセットのデータのうちの部分データを抽出するステップと、
当該部分データを非携帯型情報機器から携帯型情報機器へ転送するステップと、

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を実行するためのコンピュータプログラムを格納した記録媒体。
【請求項６】非携帯型情報機器に格納されているフルセットのデータの一部を受信する携帯型情報機器であって、
前記フルセットのデータのうちの部分データを抽出するために用いられる、携帯型情報機器において行われた各データ項目の参照に関するデータ参照履歴情報を更新・保持する手段と、
更新された前記データ参照履歴情報を非携帯型情報機器に送信する送信手段と、
非携帯型情報機器から、前記データ参照履歴情報に基づいて抽出された部分データを受信する受信手段と、
この受信した部分データを格納する記憶手段と、
を備えた携帯型情報機器。
【請求項７】前記データ参照履歴情報を更新・保持する手段は、更新されたデータ参照履歴情報についてフラグを立て、前記送信手段は、当該フラグが立ったデータ参照履歴情報のみを前記非携帯型情報機器に送信し、送信後に当該フラグを基に戻す請求項６記載の携帯型情報機器。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、データ通信機能付きの携帯型電話機、通信機能付きのＰＤＡ（Personal Digital Assistant）、携帯型小型パーソナルコンピュータ（パソコン）等の携帯型情報機器に関し、特にそれが保持する部分データをサーバ内のフルセットのデータと同期化する方法に関する。
【０００２】
【従来の技術】上記のような携帯型情報機器は、必要なときに任意の場所で必要なデータを記録、参照、更新することができるだけでなく、電話、ＦＡＸ、電子メール、インターネットホームページ閲覧、等の種々の機能を備えているため、極めて便利なツールとなる。
【０００３】このような携帯型情報機器は、通信機能を備えているため、外部からインターネット等を介して、例えばデスクトップ型パソコンのような非携帯型の情報機器が保持しているデータを参照（利用）することができる。このようなデータとしては、例えば、電話帳データ、名刺データ、スケジュールデータ、Ｔｏ−Ｄｏリスト等の種々のデータが挙げられる。
【０００４】
【発明が解決しようとする課題】しかし、外部からデータを利用する度に、非携帯型情報機器のフルセットのデータの中から目的のデータを検索して探し出すのは煩雑である。また、そのための操作および処理に時間がかかり、公衆回線を利用する場合には、電話料金がかさむことになる。
【０００５】したがって、携帯型情報機器内部には、デ

スクトップ型パソコンのような非携帯型の情報機器と同じデータを共有して保持することが好ましい。（このような携帯型情報機器がデータを共有する相手の情報機器を以下では「サーバ」と呼ぶ。）

しかし、携帯型情報機器は、小型である故に、磁気ディスクのような大容量の記憶装置を搭載することができず、そのデータ記憶容量は非携帯型のパソコンのそれに比べて制限されたものとなる。そのため、非携帯型情報機器と同じデータを共有するといっても、そのデータはフルセットのデータではなく部分的なデータとならざるを得ない。

【０００６】また、非携帯型情報機器に格納されているフルセットのデータはその内容が更新されることがあり、その観点から、携帯型情報機器ではデータが必要となる度にフルセットのデータから部分データをコピーすることが好ましい。このような、携帯型情報機器に保持する部分データを非携帯型情報機器の保持するフルセットのデータに一致させることを「同期化」という。

【０００７】そこで、非携帯型情報機器から携帯型情報機器に部分データを取り込むとき、フルセットのデータの中からどの部分を取り出すかという問題が生じる。単に、任意の所定数のデータ項目あるいは所定量のデータを取り出したのでは、必要なデータがその中に含まれていない場合がありうる。

【０００８】本発明は、このような背景においてなされたものであり、その目的は、携帯型情報機器が保持すべき部分データを非携帯型情報機器の保持するフルセットのデータと同期化する際の新規な方法を提供することにある。

【０００９】本発明の他の目的は、携帯型情報機器におけるユーザのデータ参照履歴情報を非携帯型情報機器に転送することにより、非携帯型情報機器において当該データ参照履歴情報に応じた部分データを抽出し、この部分データを携帯型情報機器へ返送する部分データ同期化方法を提供することにある。

【００１０】本発明のさらに他の目的は、そのような方法を実施する携帯型情報機器を提供することにある。

【００１１】
【課題を解決するための手段】本発明による部分データ同期化方法は、非携帯型情報機器に格納されているフルセットのデータの一部を携帯型情報機器へ転送する部分データ同期化方法であって、携帯型情報機器において行われた各データ項目の参照に関するデータ参照履歴情報を非携帯型情報機器に転送し、非携帯型情報機器では、フルセットのデータに関する、携帯型情報機器でのデータ参照履歴情報に基づいて、前記フルセットのデータのうちの部分データを抽出し、当該部分データを非携帯型情報機器から携帯型情報機器へ転送することを特徴とする。

【００１２】「データ項目」は、任意のデータでありう

る。例えば、個人情報における電話番号、ＦＡＸ番号、電子メールアドレス等である。あるいは、それらをまとめた個人単位のデータを１項目とする場合もありうる。

【００１３】「参照」とは、そのデータ項目が有効に利用されたことを意味し、データ項目の種類によって異なる動作でありうる。例えば、電話番号ではその番号の相手へ電話を掛けること、ＦＡＸ番号ではその番号の相手へＦＡＸを送ること、電子メールアドレスではその相手へメールを送ること等、である。

【００１４】本発明により、携帯型情報機器に保持する部分データを手動で更新する必要なく、非携帯型情報機器のフルセットのデータに一致させることができる。また、携帯型情報機器での参照履歴情報を基にフルセットのデータから部分データを抽出するので、非携帯型情報機器の記憶容量が限られていてもより利用率の高いデータ項目を部分データに含ませることができる。

【００１５】部分データ抽出の一態様として、前記非携帯型情報機器において、前記フルセットのデータの各データ項目について、それが最後に参照された日時を含む参照履歴情報を更新・管理し、前記部分データとして、最近参照されたデータ項目から優先的に抽出する。

【００１６】部分データ抽出の他の態様として、前記非携帯型情報機器において、前記フルセットのデータの各データ項目について、過去の代表的な参照時間間隔と最後に参照された最新参照時刻とを含むデータ参照履歴情報を更新・管理し、各データ項目について、前記時間間隔および最近参照時刻に基づいて次に参照される時刻を予測し、前記部分データとして、前記複数のデータ項目のうち予測された時刻が現在に近いものから優先的に抽出する。

【００１７】ここに、「代表的な参照時間間隔」とは、例えば過去数回の参照時点の平均時間間隔である。「時刻」は日時をも含むものとする。この実施態様によれば、いずれのデータ項目への参照がない期間中であっても、参照する時刻に応じて抽出される部分データが動的に変化する。これは、予測される次回の参照時刻と現在時刻との関係が時々刻々変化するからである。これによって、各データ項目の過去の参照履歴から分かる参照周期に照らして、現在時刻に応じた参照の可能性の高いデータ項目のサブセットが参照候補として選択される。したがって、参照頻度が比較的に低いデータ項目であっても周期的に参照されるデータ項目は、その周期が到来する時点付近で自動的に参照候補の上位に位置されるので、より適切な部分データの抽出が行える。

【００１８】より具体的には、各データ項目について、次式により、予め定められた指標値RefDis(Di,t)を算出し、
RefDis(Di,t)＝ａｂｓ（Ｔ（Ｄｉ）＋Ｉ（Ｄｉ）－t）
（ここに、”Ｔ（Ｄｉ）”および”Ｉ（Ｄｉ）”は、そ

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れぞれ、データ項目Ｄｉについての最後の参照時刻と、最近の所定回数の代表的な参照時間間隔である）前記式により計算される指標値RefDis(Di,t)を基に、各データ項目の次に参照される時刻を予測する。

【００１９】また、本発明は、非携帯型情報機器に格納されているフルセットのデータの一部を携帯型情報機器へ転送する部分データ同期化方法を実現するためのコンピュータプログラムを格納した記録媒体としても把えることができ、その部分データ同期化方法は、携帯型情報機器において行われた各データ項目の参照に関するデータ参照履歴情報を非携帯型情報機器に転送するステップと、非携帯型情報機器において、フルセットのデータに関する、携帯型情報機器でのデータ参照履歴情報に基づいて、前記フルセットのデータのうちの部分データを抽出するステップと、当該部分データを非携帯型情報機器から携帯型情報機器へ転送するステップとを備える。

【００２０】さらに、本発明による携帯がたい情報機器は、非携帯型情報機器に格納されているフルセットのデータの一部を受信する携帯型情報機器であって、前記フルセットのデータのうちの部分データを抽出するために用いられる、携帯型情報機器において行われた各データ項目の参照に関するデータ参照履歴情報を更新・保持する手段と、更新された前記データ参照履歴情報を非携帯型情報機器に送信する送信手段と、非携帯型情報機器から、前記データ参照履歴情報に基づいて抽出された部分データを受信する受信手段と、この受信した部分データを格納する記憶手段とを備えたものである。

【００２１】この装置において、好ましくは、前記データ参照履歴情報を更新・保持する手段は、更新されたデータ参照履歴情報についてフラグを立て、前記送信手段は、当該フラグが立ったデータ参照履歴情報のみを前記非携帯型情報機器に送信し、送信後に当該フラグを元に戻す。これにより、変化のあったデータ参照履歴情報についてのみ非携帯型情報機器へ送信すれば済む。

【００２２】
【発明の実施の形態】以下、本発明の好適な実施の形態について、図面により詳細に説明する。

【００２３】まず、図１により、本実施の形態における携帯型情報機器の概略の部分データ同期化の態様を説明する。

【００２４】携帯型情報機器１０は、例えば、データ通信機能付きの携帯型電話機、通信機能付きのＰＤＡ、あるいは携帯型小型パソコンなどである。

【００２５】個人情報（電話帳データや名刺データを含む）、スケジュールデータ、Ｔｏ−Ｄｏリスト等のフルセットのデータは、非携帯型情報機器であるサーバ２０の記憶装置２１に格納されている。サーバ２０にはＬＡＮを介してパソコンＰＣ３０に接続されており、ＰＣ３０からサーバ２０のデータを参照したり、更新したりできる。サーバ２０とＰＣ３０とは、図では別々に示した

が、１台のＰＣが兼ねてもよい。

【００２６】このサーバ２０の記憶装置２１に格納されたフルセットのデータの一部（部分データ）は、通信媒体を介して携帯型情報機器１０に転送され、その内部の記憶装置に格納される。通信媒体として、本実施の形態では、インターネットを例として挙げるが、赤外線通信、有線によるシリアル通信等、携帯型情報機器と非携帯型情報機器との間でデータを転送できるものであれば、任意のものを利用できる。

【００２７】携帯型情報機器１０において、新たにデータを参照（利用）しようとするとき、または、ユーザにより指示されたとき、その携帯型情報機器１０において記憶している参照履歴情報をサーバ２０へ転送し、この参照履歴情報に基づいて、後述するように部分データを抽出する。この抽出された部分データが携帯型情報機器１０に返送され、内部の記憶装置内に格納される。携帯型情報機器１０のユーザは、その部分データの中から目的のデータを探し出して、利用する。サーバ２０では、過去のデータ参照履歴情報に基づいて部分データを抽出することにより、ユーザの利用の可能性の高いデータ項目を部分データの中に含めることができる。

【００２８】本実施の形態における「参照」は、データ項目が電話番号ではその番号の相手へ電話を掛けること、ＦＡＸ番号ではその番号の相手へＦＡＸを送ること、電子メールアドレスではその相手へメールを送ること、である。また、「参照履歴情報」は、どのデータ項目について参照をいつ行ったかを示す情報（参照日時）である。

【００２９】図２に、本発明を適用しうる携帯型情報機器の概略のハードウエア構成を示す。この構成において、中央処理装置（ＣＰＵ）１０１は、携帯型情報機器１０全体の制御を司る。ＣＰＵ１０１には、ＲＯＭ１０５、フラッシュメモリ１０７、ＲＡＭ１０８、カレンダーＩＣ１０９、赤外線通信制御部１１０、平面ディスプレイ１２２、各種キー１３１、通信制御部１３３、および音声処理部１３８が接続されている。

【００３０】ＲＯＭ１０５は、読み出し専用の不揮発性メモリであり、ＣＰＵ１０１が実行する各種コンピュータプログラムおよび必要なデータを格納している。

【００３１】フラッシュメモリ１０７は、書き換え可能な不揮発性メモリであり、利用者が不揮発的に記憶しておきたい上述した個人情報等の各種のデータを格納しておくためのものである。「個人情報」には、個人、法人、各種団体等（これらを総称して「個人」という）の名前、名称等の他、各種通信アドレスとしての、電話番号（携帯電話やＰＨＳ電話の番号を含む）、ＦＡＸ番号、電子メールアドレス、ＵＲＬ等を含みうる。また、バージョンアップ可能なプログラムもフラッシュメモリ１０７に格納することができる。但し、このような所期の目的を達成する記憶手段であればフラッシュメモリで

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ある必要はない。

【００３２】ＲＡＭ１０８は、ＣＰＵ１０１がプログラムの実行処理を行う上で必要とされる一時記憶領域、作業領域や、プログラム実行に必要な各種データを格納する領域を提供する。

【００３３】カレンダーＩＣ１０９は、バッテリバックアップされており、常時、現在の日時データを提供する。

【００３４】赤外線通信制御部１１０は、他の情報機器と赤外線を介してデータ通信を行うための制御部であり、これを利用してサーバ２０から部分データの取得を行うこともできる。

【００３５】平面ディスプレイ１２２は、この携帯型情報機器における各種情報を利用者に対して知らしめるための表示を行うデバイスである。

【００３６】通信制御部１３３は、音声およびデータの無線通信を制御する部位であり、ＲＦ部１３４を介してアンテナ１３５に接続され、無線信号の処理を行う。

【００３７】音声処理部１３８は、電話機能付きの携帯型情報機器またはＰＤＡ機能付きの電話機において備えられる手段であり、マイク１３６およびスピーカ１３７に接続されて、音声入出力の処理を行う。

【００３８】なお、図２において、細部の構成（例えば、表示メモリ、表示コントローラや、入出力制御部等）は図示省略してある。

【００３９】次に、図３により、本発明の部分データ同期化のための、携帯型情報機器１０とサーバ２０との間のデータ通信時にそれぞれにおいて実行される処理を説明する。

【００４０】携帯型情報機器１０のユーザは、新たにデータ項目を参照（利用）しようとするとき、または、部分データを取得または更新したいとき、インターネット等の通信媒体を介してサーバ２０に接続する（Ｓ１１）。一方、サーバ２０もこれに応じて携帯型情報機器１０との接続を行う（Ｓ２１）。

【００４１】そこで、携帯型情報機器１０は過去のデータ参照履歴情報をサーバ２０へ送信する（Ｓ１２）。ここで送信するデータ参照履歴情報は、未だサーバ２０へ送信されていないもの（後述する図７のチェンジフラグＣＦの値が”１”のもの）のみである。携帯型情報機器１０は、この送信後に、当該チェンジフラグＣＦを”０”に戻す。

【００４２】サーバ２０は、この参照履歴情報を受信し（Ｓ２２）、これに基づいて管理データを更新する（Ｓ２３）。管理データは、個々のデータ項目について、それが部分データに含まれるべきか否かを判断するために用いられるデータであり、その具体例については後述する。サーバ２０は、この管理データに基づいて部分データを抽出する（Ｓ２４）。さらに、この抽出された部分データを携帯型情報機器１０へ送信する（Ｓ２５）。

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【００４３】インターネットを利用したデータの送受信は、例えば、ｈｔｔｐ(hyper texttransfer protocol)によるテキストやＨＴＭＬ(hyper text mark-up language)文書の形式、あるいはメールの形式で行うことができる。

【００４４】携帯型情報機器１０は、この部分データを受信して、内部の記憶装置に格納する（Ｓ１３）。その際、必要に応じて、データ形式の変換を行ってもよい。その後、サーバ２０との接続を終了する（Ｓ１４）。サーバ２０も携帯型情報機器１０との接続を終了する（Ｓ２６）。

【００４５】このようにして、携帯型情報機器１０には最新の部分データが得られる。携帯型情報機器１０のユーザは、サーバ２０との接続を終了した後に、この部分データの中から目的のデータ項目を探すことができる。部分データは参照履歴情報を基に抽出されているので、ユーザの目的のデータ項目がこの部分データの中に含まれている可能性が高まる。当然ながら、この部分データの中に含まれていなければ、再度、サーバ２０に接続して、従来の方法で、目的のデータ項目を探すことができる。

【００４６】ステップＳ２４におけるデータ抽出のアルゴリズムとしては、１セットの複数のデータ項目の中からそれより少数のデータ項目のサブセット、すなわち部分データを選択する手法の一つとしてのＬＲＵ(Least Recently Used)を用いることができる。これは、最近利用されたデータ項目ほど今後の利用の確率が高いと考えて、より最近利用された上位の所定数のデータ項目を部分データとして選択するものである。このＬＲＵ自体は階層記憶システムのリプレースメントアルゴリズムとして周知の技術であるが、本実施の形態では、これを携帯型情報機器の部分データ同期化に用いた点に特徴がある。

【００４７】ところで、一般に、複数のデータ項目が存在する場合、利用頻度の高いデータ項目と低いデータ項目とがある。利用頻度の低いデータ項目が偶然最近利用されたような場合、ＬＲＵでは、しばらくの間、そのデータ項目が将来的にも利用する可能性が高いデータ項目として選択されることになる。これは、実際上の要請には合致しない。とはいえ、利用頻度の低いデータ項目でも、ある程度、その利用に周期性がみられる場合もあり、その周期に合わせて部分データとして選択されたりされなかったりすることが好ましい。そこで、別のデータ抽出アルゴリズムとして、このＬＲＵの他に、次のような新規なアルゴリズムを用いてもよい。これを図４により説明する。

【００４８】説明を簡単にするために、４つのデータ項目Ｄ１～Ｄ４について現在時点 t における部分データ抽出のためのデータ項目の優先順位を考える。この例では、データ項目は、例えば、個人情報における電話番

号、ＦＡＸ番号、電子メールアドレス等のいずれか、またはそれらの混在したものである。名刺データ等では、それらをまとめた個人単位のデータを１項目としてもよい。

【００４９】図４において、マーク”＊”は過去において実際に当該データ項目が参照された時点を示す。また、マーク”□”は次に当該データ項目が参照されると予測される参照時点を示す。

【００５０】本実施の形態において、部分データ抽出のための優先順位を決定する際の判断の基準となる変数と

$$RefDis(Di,t)＝abs（T（Di）＋I（Di）－t）　…（1）$$

ここに、Ｔ（Ｄｉ）＋Ｉ（Ｄｉ）は、データＤｉが次に参照される予測時点の時刻（日時）であり、Ｔ（Ｄｉ）＋Ｉ（Ｄｉ）－ｔは、現在時刻から次の参照予測時刻までの時間である。この時間が負の場合には、参照予測時刻を越えて未だそのデータ項目が参照されていないことを意味する。”ａｂｓ（）”はかっこ内の変数または式の絶対値をとる演算子である。上記式（１）は、例えば、プログラムに組み込まれた形でＲＯＭ１０５に記憶されている。

【００５２】図４の例では、時刻ｔにおけるRefDis(Di,t)の値（Δ付き番号で示す）は、Δ１＜Δ４＜Δ２＜Δ３となっている。したがって、現在時点では、この順序にデータ項目の参照可能性が高いことになる。実際の用途では、多数のデータ項目のセットの中からこの優先順位にしたがって、部分データ、すなわち、所定数のデータ項目のサブセットが抽出される。

【００５３】このような部分データ抽出のためには、各データ項目について、その最後の参照時刻”Ｔ（Ｄｉ）”と、最近の所定回数の代表的な参照時間間隔”Ｉ（Ｄｉ）”を管理データとして保持・更新する必要がある。図５に管理データ更新処理のフローチャートを示す。この管理データ更新処理は、任意のデータ項目に対する「参照」がある度に、または、定期的もしくはユーザの指示時に行う。図５の例では、図３のフローに示したように、データ項目の参照に先立って行うこととする。この処理は、図３のステップＳ２３に対応する。

【００５４】図５のフローにおいて、まず、あるデータ項目への参照があった日時（この例では現在日時）を変数ｔに格納する（Ｓ３１）。ついで、当該参照されたデータ項目の番号ｉを確認する（Ｓ３２）。そこで、そのデータ項目Ｄｉの最後の参照時刻を示す変数Ｔ（Ｄｉ）に変数ｔの値（先に格納した参照日時）を入力する（Ｓ３３）。変数Ｔ（Ｄｉ）の初期値は０である。さらに、当該データ項目Ｄｉの参照間隔Ｉ（Ｄｉ）を更新する（Ｓ３４）。これは、例えば、記憶されている各データ項目の過去３回の参照時点の日時を記憶しておき、当該データ項目の参照の平均時間間隔を算出することにより行う。

【００５５】定期的もしくはユーザの指示時にこの管理

して、各データ項目Ｄｉについて、その最後の参照時刻”Ｔ（Ｄｉ）”と、最近の所定回数の代表的な参照時間間隔”Ｉ（Ｄｉ）”を用いる。本実施の形態では、「代表的な参照時間間隔」は過去数回の参照の平均時間間隔であり、「時刻」は日時である。

【００５１】これらの２つの変数を逐次、更新・管理しておき、任意のデータ項目を参照しようとするときには、各データ項目の２変数の値に基づいて、次式により各データ項目について現在の時刻ｔにおける指標値RefDis(Di,t)を算出する。

データ更新処理を行う場合には、前回の更新処理の実行の後に、複数のデータ項目への参照がありうる。この場合には、この処理を当該参照の回数だけ繰り返す。

【００５６】次に、このように更新・管理されている管理データに基づいて行われる部分データの抽出処理を説明する。これは図３のステップ２４の処理に対応する。この処理例を図６のフローチャートに示す。

【００５７】まず、現在の日時を変数ｔに格納する（Ｓ４１）。ついで、番号変数ｉを”１”にする（Ｓ４２）。

【００５８】そこで、上記式（１）のRefDis(Di,t)の算出を行う（Ｓ４３）。この計算を、番号変数ｉが”１”からｉの最大数まで繰り返して行う（Ｓ４３，Ｓ４４，Ｓ４５）。

【００５９】その後、指標RefDis(Di,t)の値をキーにしてその値が小さい順にデータ項目をソートする（Ｓ４６）。このソートの結果、予め定めた上位ｎ個のデータ項目を目的の部分データとして選択する（Ｓ４７）。

【００６０】以下、本発明による部分データ抽出の具体的な応用例を説明する。

【００６１】図７は、携帯型情報機器１０において管理される個人情報の登録例を示す。この例は、個人の情報をカード５０の形式で登録する場合に対応し、電話、ＦＡＸ、電子メール(e-mail)、ＵＲＬ(Uniform Resource Locator)のような各種の通信アドレスについて、それぞれの最近の３回の参照日時を記憶している。また、参照履歴情報が変化したか否かを示すチェンジフラグＣＦを各通信アドレスについて有する。チェンジフラグＣＦは、初期的には”０”であり、この例では、当該通信アドレスが利用されたときに”１”とされ、サーバ２０に当該参照履歴情報が通知された後に、”０”に戻される。このチェンジフラグＣＦを設けたことにより、携帯型情報機器１０に保持しているすべての参照履歴情報をサーバ２０へ送信する必要がなくなる。図７の例では、通信アドレス単位にチェンジフラグＣＦを設けているが、各最新参照日時単位に設けるようにしてもよい。

【００６２】カード５０には、その他、当該個人の住所、職業、備考等を登録してもよい。また、記憶しておく参照日時の回数は３回より多くてもよい。

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【００６３】上記式（１）を用いる実施形態では、図７のような個人情報を「参照」しようとする際、携帯型情報機器１０の内部の記憶装置（例えば、図２のＲＡＭ１０８またはフラッシュメモリ１０７）に新たな部分データを取り込む。その際に、サーバ２０において、フルセットのデータの参照履歴情報に基づいて部分データの抽出を行い、抽出された部分データを携帯型情報機器１０へ転送する。ここでのデータ項目は、個人単位の一組の各種通信アドレスである。これらの複数種の通信アドレスの参照日時に基づいて、通信アドレス毎に上記式（１）の計算を行い、得られた複数の指標値RefDis(Di,t)のうち最も小さい値をその個人の指標値として使用する。

【００６４】図８は、１０人の個人情報を表示したＰＤＡの画面例を示す。この場合、部分データのデータ項目は個人情報であり、データ項目の個数は１０またはそれ以上である。この画面では、表示された１０人について、その番号順に、それぞれいずれかの通信アドレスの予測参照時刻が現在時刻により近い。好ましくは各個人毎に、当該通信アドレス、すなわち、複数の通信アドレスのうち指標値が最も小さい通信アドレスを他の通信アドレスとして区別して表示する。これにより、ユーザは、その通信アドレスに基づいてこの部分データの抽出が行われたことを認識できる。

【００６５】複数種の通信アドレスの参照履歴データを混在して用いる代わりに、通信アドレスの種類を最初に指定し、その通信アドレスのみを用いて部分データ抽出を行うようにしてもよい。例えば、電話を掛けようとするとき、ユーザによる特定のボタンまたはメニューの操作で「電話番号」という通信アドレスを指定することにより、他の種類の通信アドレスの参照履歴による部分データ抽出への影響を排除することができる。

【００６６】なお、画面内に表示できなかった他の個人の情報については、画像のスクロールにより後続の個人情報を表示させることもできる。

【００６７】本実施の形態では、画面内容はハイパーテキスト・マークアップ言語（ＨＴＭＬ：Hyper Text Markup Language)で記載され、この文書がブラウザで解釈されて画面上に表示される。ブラウザ画面上に表示された電話番号等の通信アドレスにはいわゆるアンカーポイントが設定されている。したがって、この携帯型情報機器で電話をかける場合には、当該アンカーポイントの設定された表示画面上の電話番号を所定の操作で選択することにより、電話番号のキー入力を行うことなく電話の発信が行える。「所定の操作」とは、目的の電話番号のアンカーポイントをペンやボタン操作等により選択することである。ＦＡＸ番号や電子メールアドレスを選択すれば、ＦＡＸまたは電子メール送信用のウインドウ（図示せず）が開かれる。ＵＲＬを選択すれば、インターネットに接続して当該ホームページの閲覧が行える。

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【００６８】図９は、携帯型電話機のディスプレイ画面に１０人分の電話番号を表示した状態を示す。この場合、部分データのデータ項目は電話番号であり、データ項目の個数は１０またはそれ以上である。電話機の電話帳に登録されている相手であってその相手名が分かっていれば、登録順の表示または検索操作によって当該相手の電話番号を探し出すことができる。しかし、本実施の形態では、単に電話帳の表示を行うだけで、過去の電話の利用履歴に照らして現在時点でユーザが電話を掛けそうな相手を電話機が自動的に選択して出力してくれる。特に周期的に電話を掛けている相手であれば、たとえその利用頻度が低くてもその周期の到来時刻近辺では、電話相手の候補として自動的に抽出される。

【００６９】なお、この場合も、表示されている任意の電話番号を指示選択することにより、当該電話番号の数値をキー入力することなく、自動発信を行うことができる。また、画像のスクロールにより後続の電話番号を表示させることができる。この場合の登録される個人情報は、図７に示したものと同じものを用いることができるが、通信アドレスとしては少なくとも電話番号があればよい。

【００７０】以上、本発明の好適な実施の形態について説明したが、請求の範囲を逸脱することなく種々の変形・変更が行えることは、当業者には明らかであろう。

【００７１】

【発明の効果】本発明によれば、携帯型情報機器に非携帯型情報機器の保持するフルセットのデータの一部である部分データを転送することにより、携帯型情報機器と非携帯型情報機器との間で二重にデータを入力したり、更新したりする手間が省ける。また、参照履歴情報に基づいて部分データを抽出することにより、比較的小さい記憶容量の記憶装置しか持たない携帯型情報機器であっても、利用の可能性のより高いデータ項目を記憶することができる。

【００７２】

【図面の簡単な説明】

【図１】本発明の実施の形態における携帯型情報機器の概略の部分データ同期化の態様を説明するための図である。

【図２】本発明を適用しうる携帯型情報機器の概略のハードウエア構成を示すブロック図である。

【図３】本発明の部分データ同期化のための、携帯型情報機器１０とサーバ２０との間のデータ通信時にそれぞれにおいて実行される処理を示すフローチャートである。

【図４】本発明の実施の形態における部分データ抽出の新規なアルゴリズムを説明するための図である。

【図５】本発明の実施の形態における管理データ更新処理のフローチャートである。

【図６】部分データの抽出処理のフローチャートであ

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る。

【図７】本発明の実施の形態において管理される個人情報の登録例を示す説明図である。

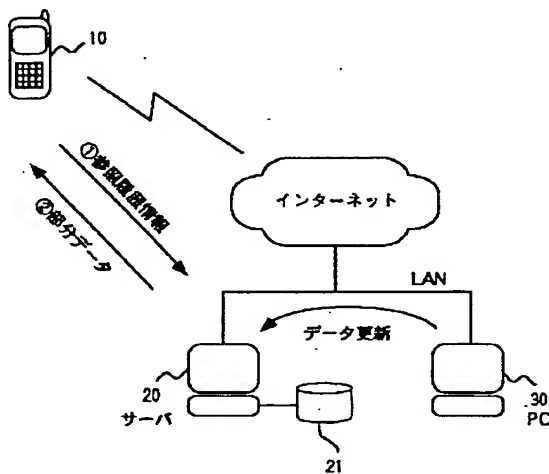【図８】本発明の実施の形態における携帯型情報機器（ＰＤＡ）のディスプレイの画面例の説明図である。

【図９】本発明の実施の形態における携帯型情報機器（電話機）のディスプレイの画面例の説明図である。

【符号の説明】
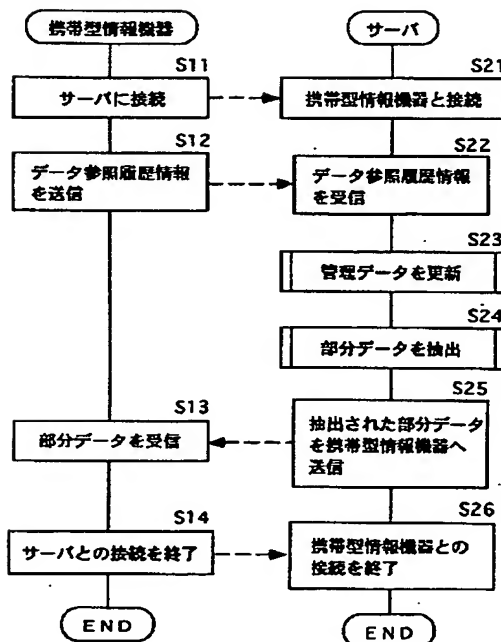
14

＊　１０…携帯型情報機器、２０…サーバ、２１…記憶装置、３０…ＰＣ、１０１…ＣＰＵ、１０５…ＲＯＭ、１０７…フラッシュメモリ、１０８…ＲＡＭ、１０９…カレンダーＩＣ、１１０…赤外線通信制御部、１２２…平面ディスプレイ、１３１…各種キー、１３３…通信制御部、１３４…ＲＦ部、１３５…アンテナ、１３６…マイク、１３７…スピーカ、１３８…音声処理部。

＊

【図１】

【図２】

【図３】

【図４】

＊：過去の参照時点

□：予測参照時点

△１＜△４＜△２＜△３

【図５】

```
        ┌──────────────────┐
        │   管理データ更新    │
        └──────────────────┘
                 │
        ┌──────────────────┐
        │   t＝参照日時       │ S31
        └──────────────────┘
                 │
   ┌────────────────────────────┐
   │ 参照されたデータ項目の番号 i を確認 │ S32
   └────────────────────────────┘
                 │
   ┌────────────────────────────┐
   │ 最後の参照日時 T（Ｄi）＝t     │ S33
   └────────────────────────────┘
                 │
   ┌────────────────────────────┐
   │ 参照間隔 I（ＤI）を更新       │ S34
   └────────────────────────────┘
                 │
        ┌──────────────────┐
        │      END          │
        └──────────────────┘
```

【図６】

```
        ┌──────────────────┐
        │   部分データ抽出     │
        └──────────────────┘
                 │
        ┌──────────────────┐
        │   t＝現在日時       │ S41
        └──────────────────┘
                 │
        ┌──────────────────┐
        │      I＝1          │ S42
        └──────────────────┘
                 │
   ┌──────────────────────────────────────┐
   │ RefDis（ＤI，t）＝abs（T（ＤI）＋I（ＤI）－t）│ S43
   └──────────────────────────────────────┘
                 │
        ┌──────────────────┐
        │     I＝I＋1        │ S44
        └──────────────────┘
                 │
        ◇ I＞I max？ ◇ S45
         No │      │ Yes
                 │
   ┌──────────────────────────────┐
   │ RefDis（ＤI，t）の値が         │ S46
   │ 小さい順にデータ項目をソート    │
   └──────────────────────────────┘
                 │
   ┌──────────────────────────────┐
   │ 上位 n 個のデータ項目を         │ S47
   │ 部分データとして選択            │
   └──────────────────────────────┘
                 │
        ┌──────────────────┐
        │      END          │
        └──────────────────┘
```
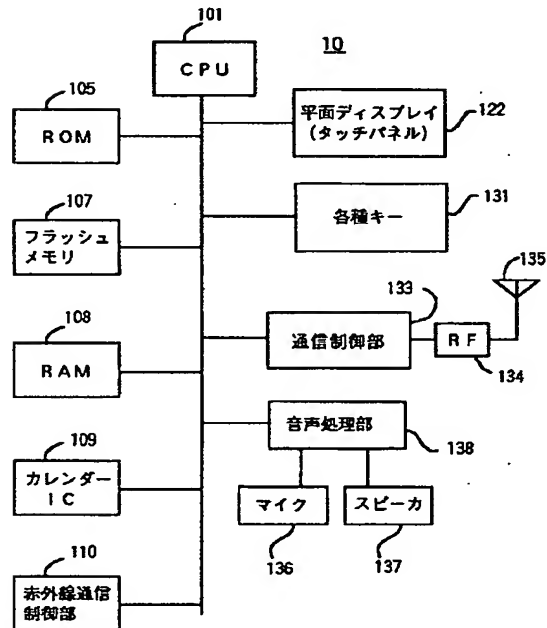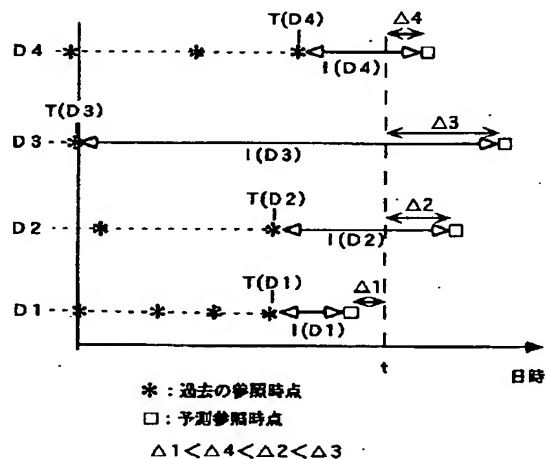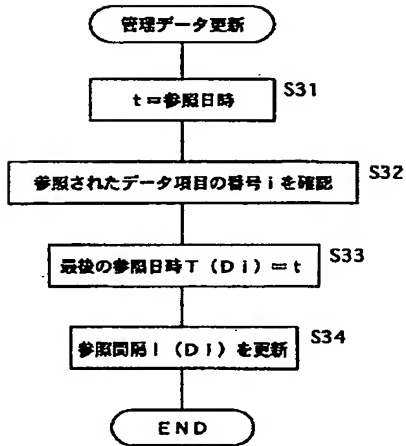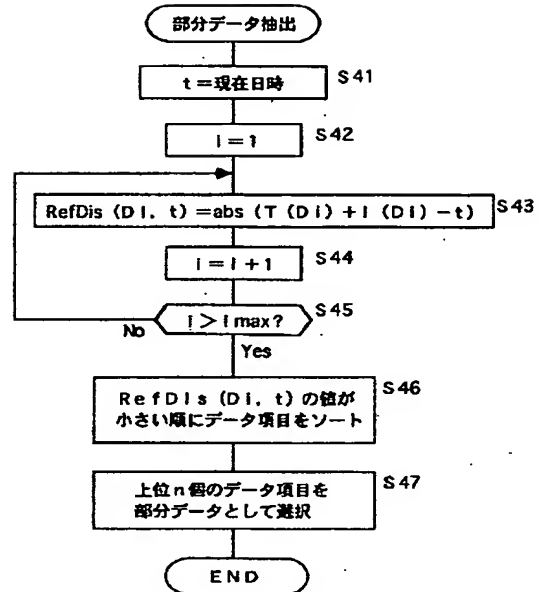
【図７】

50

名前　　山田　太郎

種別	通信アドレス	第1最新参照日時	第2最新参照日時	第3最新参照日時	CF
電話	03-xxxx-1111	1998.05.23.13:01	1998.05.20.15:01	1998.05.18.16:03	1
FAX	03-xxxx-1112.	1998.05.21.10:23	1998.05.14.15:01	1998.05.07.14:31	0
e-mail	taro@xxx.co.jp	1998.05.23.11:03	1998.05.22.13:02	1998.05.21.15:01	0
URL	・・・	・・・	・・・	・・・	-

【図８】　　　　　　　　　　　　　　　　　　　　　【図９】

1．山田太郎 tel:03-xxx-1111 fax:03-xxx-1112 e-mail: taro@...	・・・
2．佐藤二郎 tel:045-xxx-2222 fax:045-xxx-2223 e-mail: jiro@...	・・・
・・・	10．高橋花子 tel:03-xxx-1010 fax:03-xxx-1011 e-mail: hanako@...

名　前	電話番号
1．山田太郎	０３－ｘｘｘｘ－１１１１
2．佐藤二郎	０４５－ｘｘｘ－２２２２
3．鈴木一郎	０４６６－ｘｘ－３３３３
10．高橋花子	０３－ｘｘｘｘ－１０１０

フロントページの続き

PATENT ABSTRACTS OF JAPAN

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(22)Date of filing :   29.06.1998   (72)Inventor : KAMATA TOMIHISA

(54) PARTIAL DATA SYNCHRONIZING METHOD AND PORTABLE INFORMATION UNIT

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a method for making the partial data which a portable information unit holds synchronize with the full set data which a non-portable information unit holds. SOLUTION: In a portable information unit, data reference history information related to reference of respective data items in the portable information unit is transferred to the non-portable information unit prior to the reference (use) of data. In the non-portable information unit, partial data in data of a full set are extracted based on the data reference history information in the portable information unit in relation to the full set data and partial data is transferred to the portable information unit.
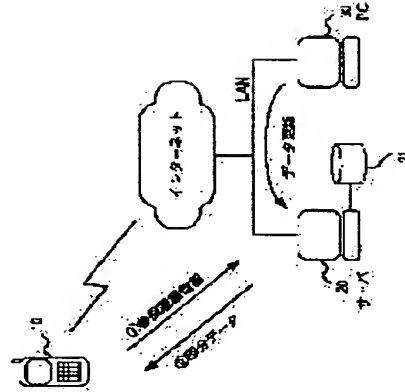
LEGAL STATUS

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[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

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[Patent number]   2991698

[Date of registration]   15.10.1999

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[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

CLAIMS

[Claim(s)]
[Claim 1] It is the partial data synchronization approach of transmitting some data of the full set stored in non-carrying mold information machines and equipment to pocket mold information machines and equipment. The data reference hysteresis information about the reference of each data item performed in pocket mold information machines and equipment is transmitted to non-carrying mold information machines and equipment. In non-carrying mold information machines and equipment The partial data synchronization approach characterized by extracting the partial data of the data of said full set, and transmitting the partial data concerned to pocket mold information machines and equipment from non-carrying mold information machines and equipment based on the data reference hysteresis information on the pocket mold information machines and equipment about the data of a full set.

[Claim 2] The partial data synchronization approach according to claim 1 preferentially extracted from the data item by which it updated and managed reference hysteresis information including the time referred to at the end, and was referred to as said partial data about each data item of the data of said full set in said non-carrying mold information machines and equipment recently.

[Claim 3] In said non-carrying mold information machines and equipment about each data item of the data of said full set The data reference hysteresis information containing the past typical reference time interval and the newest reference time of day referred to at the last is updated and managed. The time of day referred to next about each data item said time interval and recently based on reference time of day is predicted. As said partial data The partial data synchronization approach according to claim 1 or 2 that time of day predicted among said two or more data items is characterized by extracting from the thing near current preferentially.

[Claim 4] About each data item, the index value RefDis (Di, t) defined beforehand is computed by the degree type, and it is $\mathrm{RefDis}(Di, t) = \mathrm{abs}\,(T(Di)+I(Di)-t)$.

("T (Di)" and "I (Di)" are the typical reference time intervals of the reference time of day of the last about a data item Di, and the latest count of predetermined here, respectively) The partial data synchronization approach according to claim 3 characterized by predicting the time of day referred to at the degree of each data item based on the index value RefDis (Di, t) calculated by said formula.

[Claim 5] It is the record medium which stored the computer program for realizing the partial data synchronization approach of transmitting some data of the full set stored in non-carrying mold information machines and equipment to pocket mold information machines and equipment. With the step transmitted to non-carrying mold information machines and equipment, the data reference hysteresis information about the reference of each data item performed in pocket mold information machines and equipment The step which extracts the partial data of the data of said full set based on the data reference hysteresis information on the pocket mold information machines and equipment about the data of a full set, The record medium which stored the computer program for performing the step which transmits the partial data concerned to pocket mold information machines and equipment from non-carrying mold information machines and equipment.

[Claim 6] They are the pocket mold information machines and equipment which receive some data of the full set stored in non-carrying mold information machines and equipment. A means to update and hold the data reference hysteresis information about the reference of each data item performed in the pocket mold information machines and equipment used in order to extract the partial data of the data of said full set, Pocket mold information machines and equipment equipped with a transmitting means to transmit said updated data reference hysteresis information to non-carrying mold information machines and equipment, a receiving means to receive the partial data extracted based on said data reference hysteresis information from non-carrying mold information machines and equipment, and a storage means to store this received partial data.

[Claim 7] They are the pocket mold information machines and equipment according to claim 6 which a means to update and hold said data reference hysteresis information sets a flag about the updated data reference hysteresis information, and transmit to said non-carrying mold information machines and equipment, and return after transmission only the data reference hysteresis information that said transmitting means stood as for the flag concerned, based on the flag concerned.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] Especially this invention relates to the approach of synchronizing the partial data which it holds with the data of the full set in a server about pocket mold information machines and equipment, such as pocket mold telephone with data communication facility, PDA with communication facility (Personal Digital Assistant), and a pocket mold small personal computer (personal computer).
[0002]
[Description of the Prior Art] Since the above pocket mold information machines and equipment are equipped with various functions, such as a telephone, FAX, an electronic mail, and the Internet homepage access, they by the way, they not only can record, refer to and update the required data which are the need in the location of arbitration, but serve as a very convenient tool.
[0003] Since such pocket mold information machines and equipment are equipped with communication facility, refer to the data which the information machines and equipment of a non-carrying mold like a desktop PC hold through the Internet etc. from the exterior for them (utilization). As such various data, such as telephone directory data, business-card data, schedule data, and a To-Do list, are mentioned, for example.
[0004]
[Problem(s) to be Solved by the Invention] However, it is complicated to search the target data out of the data of the full set of non-carrying mold information machines and equipment, whenever it uses data from the exterior, and to discover. Moreover, when the actuation and processing for it take time amount and it uses a public line, a telephone rate will increase.
[0005] Therefore, it is desirable to share and hold the same data as the information machines and equipment of a non-carrying mold like a desktop

PC inside pocket mold information machines and equipment. (Below, such pocket mold information machines and equipment call a "server" the information machines and equipment of the partner who shares data.) However, pocket mold information machines and equipment could not carry a mass store like a magnetic disk, because it was small, but the data storage capacity was restricted compared with it of the personal computer of a non-carrying mold. Therefore, the data cannot but become the flume which shares the same data as non-carrying mold information machines and equipment not with the data of a full set but with partial data.
[0006] Moreover, as for the data of the full set stored in non-carrying mold information machines and equipment, it is desirable to copy partial data from the data of a full set, whenever the content may be updated and data are needed with pocket mold information machines and equipment from the viewpoint. It is called "synchronization" to make it in agreement with the data of a full set with which non-carrying mold information machines and equipment hold the partial data held to such pocket mold information machines and equipment.
[0007] Then, when incorporating partial data from non-carrying mold information machines and equipment to pocket mold information machines and equipment, the problem which part to take out out of the data of a full set arises. By having taken out the data item of the predetermined number of arbitration, or the data of the specified quantity, required data may not only be contained in it.
[0008] This invention is made in such a background and the object is in offering the new approach at the time of synchronizing with the data of a full set with which non-carrying mold information machines and equipment hold the partial data which pocket mold information machines and equipment should hold.
[0009] By transmitting a user's data reference hysteresis information in pocket mold information machines and equipment to non-carrying mold information machines and equipment, other objects of this invention extract the partial data according to the data reference hysteresis information concerned in non-carrying mold information machines and equipment, and are to offer the partial data synchronization approach of returning this partial data to pocket mold information machines and equipment.
[0010] The object of further others of this invention is to offer the pocket mold information machines and equipment which enforce such an approach.
[0011]
[Means for Solving the Problem] The partial data synchronization approach by this invention is the partial data synchronization approach of transmitting some data of the full set stored in non-carrying mold information machines and equipment to pocket mold information machines and equipment. The

data reference hysteresis information about the reference of each data item performed in pocket mold information machines and equipment is transmitted to non-carrying mold information machines and equipment. In non-carrying mold information machines and equipment Based on the data reference hysteresis information on the pocket mold information machines and equipment about the data of a full set, the partial data of the data of said full set are extracted, and it is characterized by transmitting the partial data concerned to pocket mold information machines and equipment from a non-carrying mold information machines and equipment.

[0012] A " data item " is data of arbitration and it deals in it. For example, they are the telephone number in individual humanity news, a FAX number, an e-mail address, etc. Or the data of an individual unit to which they were summarized can be made into one item.

[0013] "Reference" means that the data item was used effectively, and it is the actuation which changes with classes of data item, and gets. for example, it comes out to telephone to the partner of the number with the telephone number, to send FAX by the FAX number to the partner of the number, to send e-mail by the e-mail address to the partner, etc.

[0014] It is not necessary to update manually the partial data held to pocket mold information machines and equipment, and can be made in agreement with the data of the full set of non-carrying mold information machines and equipment by this invention. Moreover, since partial data are extracted from the data of a full set based on the reference hysteresis information on pocket mold information machines and equipment, even if the memory capacity of non-carrying mold information machines and equipment is restricted, a data item with a more high utilization factor can be included in partial data.

[0015] As one mode of partial data extraction, in said non-carrying mold information machines and equipment, reference hysteresis information including the time in which it was referred to at the end about each data item of the data of said full set is updated and managed, and it extracts from the data item referred to recently preferentially as said partial data.

[0016] As other modes of partial data extraction, it sets to said non-carrying mold information machines and equipment. The data reference hysteresis information which contains the past typical reference time interval and the newest reference time of day referred to at the last about each data item of the data of said full set is updated and managed. The time of day referred to next about each data item said time interval and recently based on reference time of day is predicted, and it extracts from what has the time of day close to current predicted among said two or more data items preferentially as said partial data.

[0017] "A typical reference time interval" is mean-time spacing at the

several past reference event here. "Time of day" shall also include time. According to this embodiment, even if it is during a period without the reference to which data item, the partial data extracted according to the time of day to refer to change dynamically. This is because the relation of the next reference time of day and current time which are predicted changes every moment. In the light of the reference period which the reference hysteresis of the past of each data item shows, the subset of the high data item of the possibility of reference according to current time is chosen as a reference candidate by this. therefore, since the data item periodically referred to even if reference frequency is comparatively alike and is a low data item is near located in a reference candidate's high order automatically the event of the period coming, it can extract more suitable partial data.

[0018] The index value RefDis (Di, t) defined beforehand is more specifically computed by the degree type about each data item, and it is RefDis(Di, t) = abs (T(Di)+I(Di)−t).

("T (Di)" and "I (Di)" are the typical reference time intervals of the reference time of day of the last about a data item Di, and the latest count of predetermined here, respectively) Based on the index value RefDis (Di, t) calculated by said formula, the time of day referred to at the degree of each data item is predicted.

[0019] Things are made. moreover — as the record medium which stored the computer program for this invention to realize the partial data synchronization approach of transmitting some data of the full set stored in non-carrying mold information machines and equipment to pocket mold information machines and equipment — ****** — In the step which transmits the data reference hysteresis information about reference of each data item to which the partial data synchronization approach was carried out in pocket mold information machines and equipment to non-carrying mold information machines and equipment, and non-carrying mold information machines and equipment Based on the data reference hysteresis information on the pocket mold information machines and equipment about the data of a full set, it has the step which extracts the partial data of the data of said full set, and the step which transmits the partial data concerned to pocket mold information machines and equipment from non-carrying mold information machines and equipment.

[0020] furthermore, carrying by this invention — being hard — information machines and equipment They are the pocket mold information machines and equipment which receive some data of the full set stored in non-carrying mold information machines and equipment. A means to update and hold the data reference hysteresis information about the reference of each data item performed in the pocket mold information machines and equipment used in order to extract the partial data of the data of said full set, It has a

transmitting means to transmit said updated data reference hysteresis information to non-carrying mold information machines and equipment, a receiving means to receive the partial data extracted based on said data reference hysteresis information from non-carrying mold information machines and equipment, and a storage means to store this received partial data.

[0021] By setting to this equipment, preferably, a means to update and hold said data reference hysteresis information sets a flag about the updated data reference hysteresis information, and said transmitting means transmits only the data reference hysteresis information the flag concerned stood to said non-carrying mold information machines and equipment, and returns the flag concerned after transmission. It will end, if this transmits to non-carrying mold information machines and equipment only about the changeful data reference hysteresis information.

[0022]

[Embodiment of the Invention] Hereafter, a drawing explains the gestalt of suitable operation of this invention to a detail.

[0023] First, drawing 1 explains the mode of partial data synchronization of the outline of the pocket mold information machines and equipment in the gestalt of this operation.

[0024] The pocket mold information machines and equipment 10 are pocket mold telephone with data communication facility, PDA with communication facility, or a pocket mold small personal computer.

[0025] The data of full sets, such as individual humanity news (telephone directory data and business-card data are included), schedule data, and a To-Do list, are stored in the storage 21 of the server 20 which is non-carrying mold information machines and equipment. It connects with the personal computer PC 30 through LAN at the server 20, and the data of a server 20 can be referred to or updated from PC30. Although it was independently indicated as the server 20 and PC30 by a diagram, one set of PC may serve.

[0026] Some data (partial data) of the full set stored in the store 21 of this server 20 are transmitted to the pocket mold information machines and equipment 10 through communication media, and it is stored in the store of this operation. As communication media, with the gestalt of this operation, although the Internet is mentioned as an example, if data can be transmitted between pocket mold information machines and equipment, such as infrared ray communication and serial communication by the cable, and non-carrying mold information machines and equipment, the thing of arbitration can be used.

[0027] In the pocket mold information machines and equipment 10, when it is newly going to refer to data (utilization), or when it is directed by the user,

the reference hysteresis information memorized in those pocket mold information machines and equipment 10 is transmitted to a server 20, and based on this reference hysteresis information, partial data are extracted so that it may mention later. This extracted partial data is returned to the pocket mold information machines and equipment 10, and is stored in internal storage. The user of the pocket mold information machines and equipment 10 discovers and uses the target data out of the partial data. In a server 20, the high data item of the possibility of utilization of a user can be included into partial data by extracting partial data based on the data reference hysteresis information on past.

[0028] "reference" in the gestalt of this operation sends e-mail to the partner in that a data item telephones to the partner of the number in the telephone number, sending FAX to the partner of the number by the FAX number, and an e-mail address — it comes out. Moreover, "reference hysteresis information" is information (reference time) which shows about which data item it referred to when.

[0029] The hardware configuration of the outline of the pocket mold information machines and equipment which can apply this invention to drawing 2 is shown. In this configuration, a central processing unit (CPU) 101 manages control of the pocket mold information-machines-and-equipment 10 whole. ROM105, a flash memory 107, RAM108, a calender IC 109, the infrared communications control section 110, the flat-surface display 122, the various keys 131, the communications control section 133, and the speech processing section 138 are connected to CPU101.

[0030] ROM105 is read-only nonvolatile memory, and stores the various computer programs and the required data which CPU101 performs.

[0031] A flash memory 107 is rewritable nonvolatile memory, and is for storing various kinds of data, such as individual humanity news which a user wants to memorize in un-volatilizing and which was mentioned above. The telephone number (the number of a cellular phone or a PHS telephone is included) as the various communication link addresses besides being the identifier (these being named generically and it being called an "individual") of an individual, a corporation, various bodies, etc., a name, etc., a FAX number, an e-mail address, URL, etc. may be included in "individual humanity news." Moreover, an upgradable program is also storable in a flash memory 107. However, if it is a storage means to attain such the desired end, it is not necessary to be a flash memory.

[0032] RAM108 offers the temporary storage and the working area which are needed when CPU101 performs program execution processing, and the field which stores various data required for program execution.

[0033] The battery back-up of the calender IC 109 is carried out, and it always offers current time data.

[0034] The infrared communications control section 110 is a control section for performing data communication through other information machines and equipment and infrared radiation, and can also acquire partial data from a server 20 using this.

[0035] The flat-surface display 122 is a device which performs the display for making the various information in these pocket mold information machines and equipment know to a user.

[0036] The communications control section 133 is a part which controls radiocommunication of voice and data, and it connects with an antenna 135 through the RF section 134, and it processes a radio signal.

[0037] The speech processing section 138 is a means which it has in pocket mold information machines and equipment with a telephone function, or telephone with a PDA function, and it connects with a microphone 136 and a loudspeaker 137, and it processes a voice input/output.

[0038] In addition, in drawing 2 , the graphic display abbreviation of the configurations (for example, display memory, a display controller, an I/O control control unit, etc.) of details has been carried out.

[0039] Next, the processing performed by drawing 3 in each at the time of the data communication between the pocket mold information machines and equipment 10 and the servers 20 for partial data synchronization of this invention is explained.

[0040] The user of the pocket mold information machines and equipment 10 connects with a server 20 through communication media, such as the Internet, to acquire or update partial data, when it is newly going to refer to a data item (utilization) (S11). On the other hand, a server 20 also makes connection with the pocket mold information machines and equipment 10 according to this (S21).

[0041] Then, the pocket mold information machines and equipment 10 transmit the data reference hysteresis information on past to a server 20 (S12). The data reference hysteresis information transmitted here is not yet transmitted to a server 20 (the value of the change flag CF of drawing 7 mentioned later is the thing of "1"). The pocket mold information machines and equipment 10 return the change flag CF concerned to "0" after this transmission.

[0042] A server 20 receives this reference hysteresis information (S22), and updates management data based on this (S23). Management data is data used in order to judge whether it should be contained in partial data about each data item, and is later mentioned about the example. A server 20 extracts partial data based on this management data (S24). Furthermore, this extracted partial data is transmitted to the pocket mold information machines and equipment 10 (S25).

[0043] The transmission and reception using the Internet of data can be

performed the format of the text by http (hyper texttransfer protocol), or a HTML (hyper text mark-up language) document, or in the form of e-mail.

[0044] The pocket mold information machines and equipment 10 receive this partial data, and store it in internal storage (S13). Data format may be changed if needed in that case. Then, connection with a server 20 is ended (S14). A server 20 also ends connection with the pocket mold information machines and equipment 10 (S26).

[0045] Thus, the newest partial data are obtained by the pocket mold information machines and equipment 10. The user of the pocket mold information machines and equipment 10 can look for the target data item out of this partial data, after ending connection with a server 20. Since partial data are extracted based on reference hysteresis information, possibility that the data item of a user's object is included in this partial data increases. Though natural, if it is not contained in this partial data, again, it can connect with a server 20 and the target data item can be looked for by the conventional approach.

[0046] As an algorithm of the data extraction in step S24, LRU (Least Recently Used) as one of the technique of choosing from it, a small number of subset, i.e., partial data, of a data item, can be used out of two or more one-set data items. It thinks that this has the high probability of future utilization of the data item used recently, and the data item of the predetermined number of the high order used more recently is chosen as partial data. Although this LRU itself is a well-known technique as a replacement algorithm of a hierarchy memory system, with the gestalt of this operation, the description is in the point of having used this for partial data synchronization of pocket mold information machines and equipment.

[0047] By the way, generally, when two or more data items exist, there are a data item with high utilization frequency and a low data item. When a data item with low utilization frequency is used by chance recently, in LRU, possibility that the data item will also use in the future will be chosen as a high data item for a while. This does not agree at the request on actual. But it is desirable for periodicity to be seen by the utilization and not to be chosen to some extent, by the data item with low utilization frequency as partial data at it according to the period. Then, the following new algorithms other than this LRU may be used as another data extraction algorithm. Drawing 4 explains this.

[0048] In order to simplify explanation, the priority of the data item for the partial data extraction in t is considered about four data items D1–D4 at the current event. the telephone number [in / at this example / in a data item / for example, / individual humanity news], a FAX number, or an e-mail address — or — those — it is intermingled. It is good also considering the data of an individual unit to which they were summarized by business-card

data as one item.

[0049] In drawing 4 , mark "*" shows the event of the data item concerned being actually referred to in the past. Moreover, mark "**" shows the reference event predicted that the data item concerned is referred to next.

[0050] as the variable which serves as criteria of the decision at the time of determining the priority for partial data extraction in the gestalt of this operation — each data item Di — the reference time of day of the last — "T(Di)" and typical reference time interval "[of the latest count of predetermined] I (Di)" is used. With the gestalt of this operation, " a typical reference time interval" is mean-time spacing of past several reference, and "time of day" is time.

[0051] These two variables are updated and managed serially, and when it is going to refer to the data item of arbitration, based on the value of two variables of each data item, the index value RefDis in the current time of day t (Di, t) is computed about each data item by the degree type.

RefDis(Di, t) = abs (T(Di)+I(Di)−t) −− (1)

It is the time of day (time) at the prediction event by which, as for T(Di)+I (Di), Data Di are referred to next here, and T(Di)+I(Di)−t is the time amount from current time to the next reference prediction time of day. When this time amount is negative, it means that that data item is not yet referred to more than reference prediction time of day. "abs ( )" is a operator which takes the variable in a parenthesis, or the absolute value of a formula. The above-mentioned formula (1) is memorized by ROM105 in the form included in the program.

[0052] In the example of drawing 4 , the value (a number with delta shows) of RefDis (Di, t) in time of day t is delta1<delta2<delta3. Therefore, in a current event, the referentiability of a data item will be high in this sequence. For a actual application, the subset of partial data, i.e., the data item of a predetermined number, is extracted according to this priority out of the set of many data items.

[0053] a such partial data extraction sake — each data item — the reference time of day of the last — the typical reference time interval of "T (Di)" and the latest count of predetermined — it is necessary to do maintenance and updating of it, using "I (Di)" as management data The flow chart of a management data update process is shown in drawing 5 . Whenever this management data update process has "reference" to the data item of arbitration, it is performed at the time of directions of periodical or a user. In the example of drawing 5 , as shown in the flow of drawing 3 , suppose that it carries out in advance of reference of a data item. This processing corresponds to step S23 of drawing 3 .

[0054] In the flow of drawing 5 , time (at the time [This example] of present in Japan) with the reference to a certain data item is first stored in Variable

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t (S31). Subsequently, the number i of the data item concerned referred to is checked (S32). Then, the value (reference time stored previously) of Variable t is inputted into variable T (Di) which shows the reference time of day of the last of the data item Di (S33). The initial value of variable T (Di) is 0. Furthermore, reference spacing [of the data item Di concerned] I (Di) is updated (S34). This memorizes the time at the three past reference event of each data item memorized, for example, and performs it by computing mean-time spacing of reference of the data item concerned.

[0055] The reference to two or more data items may be periodical or after activation of the last update process when performing this management data update process at the time of directions of a user. In this case, only the count of the reference concerned repeats this processing.

[0056] Next, the extract processing of partial data performed based on the management data updated and managed in this way is explained. This corresponds to processing of step 24 of drawing 3 . This example of processing is shown in the flow chart of drawing 6 .

[0057] First, current time is stored in Variable t (S41). Subsequently, the number variable i is set to "1" (S42).

[0058] Then, RefDis (Di, t) of the above-mentioned formula (1) is computed (S43). The number variable i repeats this count to the maximum number of "1" to i, and it is performed (S43, S44, S45).

[0059] Then, the value of Index RefDis (Di; t) is used as a key, and the value sorts a data item in small order (S46). The data item of n high orders defined beforehand is chosen as target partial data as a result of this sort (S47).

[0060] Hereafter, the concrete application of the partial data extraction by this invention is explained.

[0061] Drawing 7 shows the example of registration of the individual humanity news managed in the pocket mold information machines and equipment 10. This example corresponded, when individual information was registered in the form of a card 50, and it has memorized 3 times of each latest reference time about a telephone, FAX, an electronic mail (e-mail), and various kinds of communication link addresses like URL (Uniform Resource Locator). Moreover, it has the change flag CF which shows whether reference hysteresis information changed about each communication link address. The change flag CF is "0" in first stage, and in this example, when the communication link address concerned is used, after being referred to as "1" and notifying the reference hysteresis information concerned to a server 20, it is returned to "0." It becomes unnecessary to transmit no reference hysteresis information currently held to the pocket mold information machines and equipment 10 to a server 20 by having formed this change flag CF. Although the change flag CF is formed per communication link address, you may make it prepare per each newest reference time in the example of

drawing 7 .

[0062] In addition to this, the address of the individual concerned, an occupation, a remark, etc. may be registered into a card 50. Moreover, there may be more counts of the reference time to memorize than 3 times.

[0063] With the operation gestalt using the above-mentioned formula (1), in this case "it is going to refer to" individual humanity news like drawing 7 , new partial data are incorporated to the store inside the pocket mold information machines and equipment 10 (for example, RAM108 or the flash memory 107 of drawing 2). In that case, partial data are extracted in a server 20 based on the reference hysteresis information on the data of a full set, and the extracted partial data are transmitted to the pocket mold information machines and equipment 10. Data items here are the various communication link addresses of the lot of an individual unit. Based on the reference time of two or more sorts of these communication link addresses, the above-mentioned formula (1) is calculated for every communication link address, and the smallest value is used as the individual's index value among two or more acquired index values RefDis (Di, t).

[0064] Drawing 8 shows the example of a screen of PDA which displayed ten persons' individual humanity news. In this case, the data item of partial data is individual humanity news, and the number of a data item is 10 or more than it. On this screen, the prediction reference time of day of one of the communication link addresses is close to that numerical order by current time respectively about ten displayed persons. Preferably, for every individual, among the communication link addresses concerned, i.e., two or more communication link addresses, an index value distinguishes the smallest communication link address as other communication link addresses, and communication link address as other communication link address. Thereby, a user can recognize that the extract of this partial data was performed based on that communication link address.

[0065] The class of communication link address is specified first and it may be made to perform partial data extraction instead of being intermingled and using the reference historical data of two or more sorts of communication link addresses only using the communication link address. For example, when it is going to telephone, the effect on the partial data extraction by the reference hysteresis of the communication link address of other classes can be eliminated by specifying the communication link address the "telephone number" by actuation of the specific carbon button by the user, or a menu.

[0066] In addition, about other individuals' information which was not able to be displayed in the screen, consecutive individual humanity news can also be displayed by scrolling of an image.

[0067] The content of a screen is indicated by HyperText Markup Language (HTML:Hyper Text Markup Language), and this document is interpreted by the browser and it is expressed as the gestalt of this operation on a screen.

The so-called anchor point is set to the communication link addresses, such as the telephone number displayed on the browser screen. Therefore, when telephoning with these pocket mold information machines and equipment, a telephone can be sent by choosing the telephone number on the display screen where the anchor point concerned was set up by predetermined actuation, without keying the telephone number. "Predetermined actuation" is choosing the anchor point of the target telephone number by the pen, button grabbing, etc. If a FAX number and an e-mail address are chosen, the window for FAX or electronic mail transmission (not shown) will be opened. If URL is chosen, the Internet is accessed and the homepage concerned can be perused.

[0068] Drawing 9 shows the condition of having displayed the telephone number of 10 persons on the display screen of pocket mold telephone. In this case, the data item of partial data is the telephone number, and the number of a data item is 10 or more than it. It is the partner registered into the telephone directory of telephone, and if the partner name is known, the telephone number of the partner concerned is discoverable with a display or retrieval actuation of the order of registration. However, with the gestalt of this operation, only by displaying a telephone directory, telephone chooses automatically the partner whom a user is likely to telephone in the light of the utilization hysteresis of the past telephone at the current event, and outputs him. If it is the partner who has telephoned periodically especially, even if the utilization frequency is low, it will be automatically extracted as a telephone partner's candidate in the arrival time-of-day neighborhood of the period.

[0069] In addition, auto calling can be performed, without keying the numeric value of the telephone number concerned by making directions selection of the telephone number of the arbitration currently displayed also in this case. Moreover, the consecutive telephone number can be displayed by scrolling of an image. Although the same thing as what was shown in drawing 7 can be used for the individual humanity news with which it registers in this case, it should just have the telephone number at least as the communication link address.

[0070] As mentioned above, although the gestalt of suitable operation of this invention was explained, probably, it will be clear to this contractor that deformation is performed and various change can be made, without deviating from a claim.

[0071]

[Effect of the Invention] According to this invention, the time and effort which inputs data into a duplex between pocket mold information machines and equipment and non-carrying mold information machines and equipment, or is updated can be saved by transmitting the partial data which are some

data of the full set which non-carrying mold information machines and
equipment hold to pocket mold information machines and equipment.
Moreover, even if it is the pocket mold information machines and equipment
which have only the store of comparatively small memory capacity by
extracting partial data based on reference hysteresis information, the higher
data item of the possibility of utilization is memorizable.
[0072]

[Translation done.]

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3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Field of the Invention] Especially this invention relates to the approach of synchronizing the partial data which it holds with the data of the full set in a server about pocket mold information machines and equipment, such as pocket mold telephone with data communication facility, PDA with communication facility (Personal Digital Assistant), and a pocket mold small personal computer (personal computer).

[Translation done.]

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PRIOR ART

[Description of the Prior Art] Since the above pocket mold information machines and equipment are equipped with various functions, such as a telephone, FAX, an electronic mail, and the Internet homepage access, they by the way, they not only can record, refer to and update the required data which are the need in the location of arbitration, but serve as a very convenient tool.

[0003] Since such pocket mold information machines and equipment are equipped with communication facility, refer to the data which the information machines and equipment of a non-carrying mold like a desktop PC hold through the Internet etc. from the exterior for them (utilization). As such data, various data, such as telephone directory data, business-card data, schedule data, and a To-Do list, are mentioned, for example.

[Translation done.]

JAPANESE [JP,2000-022839,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT
OF THE INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF
DRAWINGS DRAWINGS

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, it is complicated to search the target data out of the data of the full set of non-carrying mold information machines and equipment, whenever it uses data from the exterior, and to discover. Moreover, when the actuation and processing for it take time amount and it uses a public line, a telephone rate will increase.
[0005] Therefore, it is desirable to share and hold the same data as the information machines and equipment of a non-carrying mold like a desktop PC inside pocket mold information machines and equipment (Below, such pocket mold information machines and equipment call a "server" the information machines and equipment of the partner who shares data.) However, pocket mold information machines and equipment could not carry a mass store like a magnetic disk, because it was small, but the data storage capacity was restricted compared with it of the personal computer of a non-carrying mold. Therefore, the data cannot but become the flume which shares the same data as non-carrying mold information machines and equipment not with the data of a full set but with partial data.
[0006] Moreover, as for the data of the full set stored in non-carrying mold information machines and equipment, it is desirable to copy partial data from the data of a full set, whenever the content may be updated and data are needed with pocket mold information machines and equipment from the viewpoint. It is called "synchronization" to make it in agreement with the data of a full set with which non-carrying mold information machines and equipment hold the partial data held to such pocket mold information machines and equipment.
[0007] Then, when incorporating partial data from non-carrying mold information machines and equipment to pocket mold information machines and equipment, the problem which part to take out out of the data of a full set arises. By having taken out the data item of the predetermined number of arbitration, or the data of the specified quantity, required data may not only

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be contained in it.
[0008] This invention is made in such a background and the object is in offering the new approach at the time of synchronizing with the data of a full set with which non-carrying mold information machines and equipment hold the partial data which pocket mold information machines and equipment should hold.
[0009] By transmitting a user's data reference hysteresis information in pocket mold information machines and equipment to non-carrying mold information machines and equipment, other objects of this invention extract the partial data according to the data reference hysteresis information concerned in non-carrying mold information machines and equipment, and are to offer the partial data synchronization approach of returning this partial data to pocket mold information machines and equipment.
[0010] The object of further others of this invention is to offer the pocket mold information machines and equipment which enforce such an approach.

[Translation done.]

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MEANS

[Means for Solving the Problem] The partial data synchronization approach by this invention is the partial data synchronization approach of transmitting some data of the full set stored in non-carrying mold information machines and equipment to pocket mold information machines and equipment. The data reference hysteresis information about the reference of each data item performed in pocket mold information machines and equipment is transmitted to non-carrying mold information machines and equipment. In non-carrying mold information machines and equipment Based on the data reference hysteresis information on the pocket mold information machines and equipment about the data of a full set, the partial data of the data of said full set are extracted, and it is characterized by transmitting the partial data concerned to pocket mold information machines and equipment from non-carrying mold information machines and equipment.

[0012] A "data item" is data of arbitration and it deals in it. For example, they are the telephone number in individual humanity news, a FAX number, an e-mail address, etc. Or the data of an individual unit to which they were summarized can be made into one item.

[0013] "Reference" means that the data item was used effectively, and it is the actuation which changes with classes of data item, and gets. for example, it comes out to telephone to the partner of the number with the telephone number, to send FAX by the FAX number to the partner of the number, to send e-mail by the e-mail address to the partner, etc.

[0014] It is not necessary to update manually the partial data held to pocket mold information machines and equipment, and can be made in agreement with the data of the full set of non-carrying mold information machines and equipment by this invention. Moreover, since partial data are extracted from the data of a full set based on the reference hysteresis information on pocket mold information machines and equipment, even if the memory capacity of non-carrying mold information machines and equipment is

restricted, a data item with a more high utilization factor can be included in partial data.

[0015] As one mode of partial data extraction, in said non-carrying mold information machines and equipment, reference hysteresis information including the time in which it was referred to at the end about each data item of the data of said full set is updated and managed, and it extracts from the data item referred to recently preferentially as said partial data.

[0016] As other modes of partial data extraction, it sets to said non-carrying mold information machines and equipment. The data reference hysteresis information which contains the past typical reference time interval and the newest reference time of day referred to at the last about each data item of the data of said full set is updated and managed. The time of day referred to next about each data item said time interval and recently based on reference time of day is predicted, and it extracts from what has the time of day close to current predicted among said two or more data items preferentially as said partial data.

[0017] "A typical reference time interval" is mean-time spacing at the several past reference event here. "Time of day" shall also include time. According to this embodiment, even if it is during a period without the reference to which data item, the partial data extracted according to the time of day to refer to change dynamically. This is because the relation of the next reference time of day and current time which are predicted changes every moment. In the light of the reference period which the reference hysteresis of the past of each data item shows, the subset of the high data item of the possibility of reference according to current time is chosen as a reference candidate by this. therefore, since the data item periodically referred to even if reference frequency is comparatively alike and is a low data item is near located in a reference candidate's high order automatically the event of the period coming, it can extract more suitable partial data.

[0018] The index value RefDis (Di, t) defined beforehand is more specifically computed by the degree type about each data item, and it is RefDis(Di, t) = abs (T(Di)+I(Di)−t).

("T (Di)" and "I (Di)" are the typical reference time intervals of the reference time of day of the last about a data item Di, and the latest count of predetermined here, respectively) Based on the index value RefDis (Di, t) calculated by said formula, the time of day referred to at the degree of each data item is predicted.

[0019] Things are made. moreover — as the record medium which stored the computer program for this invention to realize the partial data synchronization approach of transmitting some data of the full set stored in non-carrying mold information machines and equipment to pocket mold information machines and equipment — ****** — In the step which

transmits the data reference hysteresis information about reference of each data item to which the partial data synchronization approach was carried out in pocket mold information machines and equipment to non-carrying mold information machines and equipment, and non-carrying mold information machines and equipment Based on the data reference hysteresis information on the pocket mold information machines and equipment about the data of a full set, it has the step which extracts the partial data of the data of said full set, and the step which transmits the partial data concerned to pocket mold information machines and equipment from non-carrying mold information machines and equipment.

[0020] furthermore, carrying by this invention -- being hard -- information machines and equipment They are the pocket mold information machines and equipment which receive some data of the full set stored in non-carrying mold information machines and equipment. A means to update and hold the data reference hysteresis information about the reference of each data item performed in the pocket mold information machines and equipment used in order to extract the partial data of the data of said full set, It has a transmitting means to transmit said updated data reference hysteresis information to non-carrying mold information machines and equipment, a receiving means to receive the partial data extracted based on said data reference hysteresis information from non-carrying mold information machines and equipment, and a storage means to store this received partial data.

[0021] By setting to this equipment, preferably, a means to update and hold said data reference hysteresis information sets a flag about the updated data reference hysteresis information, and said transmitting means transmits only the data reference hysteresis information the flag concerned stood to said non-carrying mold information machines and equipment, and returns the flag concerned after transmission. It will end, if this transmits to non-carrying mold information machines and equipment only about the changeful data reference hysteresis information.

[0022]
[Embodiment of the Invention] Hereafter, a drawing explains the gestalt of suitable operation of this invention to a detail.
[0023] First, drawing 1 explains the mode of partial data synchronization of the outline of the pocket mold information machines and equipment in the gestalt of this operation.
[0024] The pocket mold information machines and equipment 10 are pocket mold telephone with data communication facility, PDA with communication facility, or a pocket mold small personal computer.
[0025] The data of full sets, such as individual humanity news (telephone directory data and business-card data are included), schedule data, and a

To-Do list, are stored in the storage 21 of the server 20 which is non-carrying mold information machines and equipment. It connects with the personal computer PC 30 through LAN at the server 20, and the data of a server 20 can be referred to or updated from PC30. Although it was independently indicated as the server 20 and PC30 by a diagram; one set of PC may serve.

[0026] Some data (partial data) of the full set stored in the store 21 of this server 20 are transmitted to the pocket mold information machines and equipment 10 through communication media, and it is stored in the store of that interior. As communication media, with the gestalt of this operation, although the Internet is mentioned as an example, if data can be transmitted between pocket mold information machines and equipment, such as infrared ray communication and serial communication by the cable, and non-carrying mold information machines and equipment, the thing of arbitration can be used.

[0027] In the pocket mold information machines and equipment 10, when it is newly going to refer to data (utilization), or when it is directed by the user, the reference hysteresis information memorized in those pocket mold information machines and equipment 10 is transmitted to a server 20, and based on this reference hysteresis information, partial data are extracted so that it may mention later. This extracted partial data is returned to the pocket mold information machines and equipment 10, and is stored in internal storage. The user of the pocket mold information machines and equipment 10 discovers and uses the target data out of the partial data. In a server 20, the high data item of the possibility of utilization of a user can be included into partial data by extracting partial data based on the data reference hysteresis information on past.

[0028] "reference" in the gestalt of this operation sends e-mail to the partner in that a data item telephones to the partner of the number in the telephone number, sending FAX to the partner of the number by the FAX number, and an e-mail address -- it comes out. Moreover, "reference hysteresis information" is information (reference time) which shows about which data item it referred to when.

[0029] The hardware configuration of the outline of the pocket mold information machines and equipment which can apply this invention to drawing 2 is shown. In this configuration, a central processing unit (CPU) 101 manages control of the pocket mold information-machines-and-equipment 10 whole. ROM105, a flash memory 107, RAM108, a calender IC 109, the infrared communications control section 110, the flat-surface display 122, the various keys 131, the communications control section 133, and the speech processing section 138 are connected to CPU101.

[0030] ROM105 is read-only nonvolatile memory, and stores the various

computer programs and the required data which CPU101 performs.

[0031] A flash memory 107 is rewritable nonvolatile memory, and is for storing various kinds of data, such as individual humanity news which a user wants to memorize in un-volatilizing and which was mentioned above. The telephone number (the number of a cellular phone or a PHS telephone is included) as the various communication link addresses besides being the identifier (these being named generically and it being called an "individual") of an individual, a corporation, various bodies, etc., a name, etc., a FAX number, an e-mail address, URL, etc. may be included in "individual humanity news." Moreover, an upgradable program is also storable in a flash memory 107. However, if it is a storage means to attain such the desired end, it is not necessary to be a flash memory.

[0032] RAM108 offers the temporary storage and the working area which are needed when CPU101 performs program execution processing, and the field which stores various data required for program execution.

[0033] The battery back-up of the calender IC 109 is carried out, and it always offers current time data.

[0034] The infrared communications control section 110 is a control section for performing data communication through other information machines and equipment and infrared radiation, and can also acquire partial data from a server 20 using this.

[0035] The flat-surface display 122 is a device which performs the display for making the various information in these pocket mold information machines and equipment know to a user.

[0036] The communications control section 133 is a part which controls radiocommunication of voice and data, and it connects with an antenna 135 through the RF section 134, and it processes a radio signal.

[0037] The speech processing section 138 is a means which it has in pocket mold information machines and equipment with a telephone function, or telephone with a PDA function, and it connects with a microphone 136 and a loudspeaker 137, and it processes a voice input/output.

[0038] In addition, in drawing 2 , the graphic display abbreviation of the configurations (for example, display memory, a display controller, an I/O control unit, etc.) of details has been carried out.

[0039] Next, the processing performed by drawing 3 in each at the time of the data communication between the pocket mold information machines and equipment 10 and the servers 20 for partial data synchronization of this invention is explained.

[0040] The user of the pocket mold information machines and equipment 10 connects with a server 20 through communication media, such as the Internet, to acquire or update partial data, when it is newly going to refer to a data item (utilization) (S11). On the other hand, a server 20 also makes

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connection with the pocket mold information machines and equipment 10 according to this (S21).

[0041] Then, the pocket mold information machines and equipment 10 transmit the data reference hysteresis information on past to a server 20 (S12). The data reference hysteresis information transmitted here is not yet transmitted to a server 20 (the value of the change flag CF of drawing 7 mentioned later is the thing of "1"). The pocket mold information machines and equipment 10 return the change flag CF concerned to "0" after this transmission.

[0042] A server 20 receives this reference hysteresis information (S22), and updates management data based on this (S23). Management data is data used in order to judge whether it should be contained in partial data about each data item, and is later mentioned about the example. A server 20 extracts partial data based on this management data (S24). Furthermore, this extracted partial data is transmitted to the pocket mold information machines and equipment 10 (S25).

[0043] The transmission and reception using the Internet of data can be performed the format of the text by http (hyper texttransfer protocol), or a HTML (hyper text mark-up language) document, or in the form of e-mail.

[0044] The pocket mold information machines and equipment 10 receive this partial data, and store it in internal storage (S13). Data format may be changed if needed in that case. Then, connection with a server 20 is ended (S14). A server 20 also ends connection with the pocket mold information machines and equipment 10 (S26).

[0045] Thus, the newest partial data are obtained by the pocket mold information machines and equipment 10. The user of the pocket mold information machines and equipment 10 can look for the target data item out of this partial data, after ending connection with a server 20. Since partial data are extracted based on reference hysteresis information, possibility that the data item of a user's object is included in this partial data increases. Though natural, if it is not contained in this partial data, again, it can connect with a server 20 and the target data item can be looked for by the conventional approach.

[0046] As an algorithm of the data extraction in step S24, LRU (Least Recently Used) as one of the technique of choosing from it, a small number of subset, i.e., partial data, of a data item, can be used out of two or more one-set data items. It thinks that this has the high probability of future utilization of the data item used recently, and the data item of the predetermined number of the high order used more recently is chosen as partial data. Although this LRU itself is a well-known technique as a replacement algorithm of a hierarchy memory system, with the gestalt of this operation, the description is in the point of having used this for partial data

synchronization of pocket mold information machines and equipment.

[0047] By the way, generally, when two or more data items exist, there are a data item with high utilization frequency and a low data item. When a data item with low utilization frequency is used by chance recently, in LRU, possibility that the data item will also use in the future will be chosen as a high data item for a while. This does not agree at the request on actual. But it is desirable for periodicity to be seen by the utilization and not to be chosen to some extent, by the data item with low utilization frequency as partial data at it according to the period. Then, the following new algorithms other than this LRU may be used as another data extraction algorithm. Drawing 4 explains this.

[0048] In order to simplify explanation, the priority of the data item for the partial data extraction in t is considered about four data items D1-D4 at the current event. the telephone number [in / at this example / in a data item / for example, / individual humanity news]. a FAX number, or an e-mail address -- or -- those -- it is intermingled. It is good also considering the data of an individual unit to which they were summarized by business-card data as one item.

[0049] In drawing 4 , mark " * " shows the event of the data item concerned being actually referred to in the past. Moreover, mark " ** " shows the reference event predicted that the data item concerned is referred to next.

[0050] as the variable which serves as criteria of the decision at the time of determining the priority for partial data extraction in the gestalt of this operation -- each data item Di -- the reference time of day of the last -- "T(Di)" and typical reference time interval "[of the latest count of predetermined] I (Di)" is used. With the gestalt of this operation, " a typical reference time interval" is mean-time spacing of past several reference, and "time of day" is time.

[0051] These two variables are updated and managed serially, and when it is going to refer to the data item of arbitration, based on the value of two variables of each data item, the index value RefDis in the current time of day t (Di, t) is computed about each data item by the degree type.

$$RefDis(Di, t) = abs (T(Di)+I(Di)-t) -- (1)$$

It is the time of day (time) at the prediction event by which, as for T(Di)+I (Di), Data Di are referred to next here, and T(Di)+I(Di)-t is the time amount from current time to the next reference prediction time of day. When this time amount is negative, it means that that data item is not yet referred to more than reference prediction time of day. " abs ( )" is a operator which takes the value in a parenthesis, or the absolute value of a formula. The above-mentioned formula (1) is memorized by ROM105 in the form included in the program.

[0052] In the example of drawing 4 , the value (a number with delta shows) of

RefDis (Di, t) in time of day t is delta1<delta4<delta2<delta3. Therefore, in a current event, the referentiability of a data item will be high in this sequence. For a actual application, the subset of partial data, i.e., the data item of a predetermined number, is extracted according to this priority out of the set of many data items.

[0053] a such partial data extraction sake -- each data item -- the reference time of day of the last -- the typical reference time interval of "T (Di)" and the latest count of predetermined -- it is necessary to do maintenance and updating of it, using "I (Di)" as management data The flow chart of a management data update process is shown in drawing 5. Whenever this management data update process has "reference" to the data item of arbitration, it is performed at the time of directions of periodical or a user. In the example of drawing 5 , as shown in the flow of drawing 3 , suppose that it carries out in advance of reference of a data item. This processing corresponds to step S23 of drawing 3 .

[0054] In the flow of drawing 5 , time (at the time [This example] of present in Japan) with the reference to a certain data item is first stored in Variable t (S31). Subsequently, the number i of the data item concerned referred to is checked (S32). Then, the value (reference time stored previously) of Variable t is inputted into variable T (Di) which shows the reference time of day of the last of the data item Di (S33). The initial value of variable T (Di) is 0. Furthermore, reference spacing [of the data item Di concerned] I (Di) is updated (S34). This memorizes the time at the three past reference event of each data item memorized, for example, and performs it by computing mean-time spacing of reference of the data item concerned.

[0055] The reference to two or more data items may be periodical or after activation of the last update process when performing this management data update process at the time of directions of a user. In this case, only the count of the reference concerned repeats this processing.

[0056] Next, the extract processing of partial data performed based on the management data updated and managed in this way is explained. This corresponds to processing of step 24 of drawing 3 . This example of processing is shown in the flow chart of drawing 6 .

[0057] First, current time is stored in Variable t (S41). Subsequently, the number variable i is set to "1" (S42).

[0058] Then, RefDis (Di, t) of the above-mentioned formula (1) is computed (S43). The number variable i repeats this count to the maximum number of "1" to i, and it is performed (S43, S44, S45).

[0059] Then, the value of Index RefDis (Di, t) is used as a key, and the value sorts a data item in small order (S46). The data item of n high orders defined beforehand is chosen as target partial data as a result of this sort (S47).

[0060] Hereafter, the concrete application of the partial data extraction by

this invention is explained.

[061] Drawing 7 shows the example of registration of the individual humanity news managed in the pocket mold information machines and equipment 10. This example corresponded, when individual information was registered in the form of a card 50, and it has memorized 3 times of each latest reference time about a telephone, FAX, an electronic mail (e-mail), and various kinds of communication link addresses like URL (Uniform Resource Locator). Moreover, it has the change flag CF which shows whether reference hysteresis information changed about each communication link address. The change flag CF is "0" in first stage, and in this example, when the communication link address concerned is used, after being referred to as "1" and notifying the reference hysteresis information concerned to a server 20, it is returned to "0." It becomes unnecessary to transmit no reference hysteresis information currently held to the pocket mold information machines and equipment 10 to a server 20 by having formed this change flag CF. Although the change flag CF is formed per communication link address, you may make it prepare per each newest reference time in the example of drawing 7.

[062] In addition to this, the address of the individual concerned, an occupation, a remark, etc. may be registered into a card 50. Moreover, there may be more counts of the reference time to memorize than 3 times.

[063] With the operation gestalt using the above-mentioned formula (1), in case "it is going to refer to" individual humanity news like drawing 7, new partial data are incorporated to the store inside the pocket mold information machines and equipment 10 (for example, RAM108 or the flash memory 107 of drawing 2). In that case, partial data are extracted in a server 20 based on the reference hysteresis information on the data of a full set, and the extracted partial data are transmitted to the pocket mold information machines and equipment 10. Data items here are the various communication link addresses of the lot of an individual unit. Based on the reference time of two or more sorts of these communication link addresses, the above-mentioned formula (1) is calculated for every communication link address, and the smallest value is used as the individual's index value among two or more acquired index values RefDis (Di; t).

[064] Drawing 8 shows the example of a screen of PDA which displayed ten persons' individual humanity news. In this case, the data item of partial data is individual humanity news, and the number of a data item is 10 or more than it. On this screen, the prediction reference time of day of one of the communication link addresses is close to that numerical order by current time respectively about ten displayed persons. Preferably, for every individual, among the communication link addresses concerned, i.e., two or more communication link addresses, an index value distinguishes the smallest

communication link address as other communication link addresses, and displays it. Thereby, a user can recognize that the extract of this partial data was performed based on that communication link address.

[065] The class of communication link address is specified first and it may be made to perform partial data extraction instead of being intermingled and using the reference historical data of two or more sorts of communication link addresses only using the communication link address. For example, when it is going to telephone, the effect on the partial data extraction by the reference hysteresis of the communication link address of other classes can be eliminated by specifying the communication link address the "telephone number" by actuation of the specific carbon button by the user, or a menu.

[066] In addition, about other individuals' information which was not able to be displayed in the screen, consecutive individual humanity news can also be displayed by scrolling of an image.

[067] The content of a screen is indicated by HyperText Markup Language (HTML:Hyper Text Markup Language), and this document is interpreted by the browser and it is expressed as the gestalt of this operation on a screen. The so-called anchor point is set to the communication link addresses, such as the telephone number displayed on the browser screen. Therefore, when telephoning with these pocket mold information machines and equipment, a telephone can be sent by choosing the telephone number on the display screen where the anchor point concerned was set up by predetermined actuation, without keying the telephone number. "Predetermined actuation" is choosing the anchor point of the target telephone number by the pen, button grabbing, etc. If a FAX number and an e-mail address are chosen, the window for FAX or electronic mail transmission (not shown) will be opened. If URL is chosen, the Internet is accessed and the homepage concerned can be perused.

[068] Drawing 9 shows the condition of having displayed the telephone number of 10 persons on the display screen of pocket mold telephone. In this case, the data item of partial data is the telephone number, and the number of a data item is 10 or more than it. It is the partner registered into the telephone directory of telephone, and if the partner name is known, the telephone number of the partner concerned is discoverable with a display or retrieval actuation of the order of registration. However, with the gestalt of this operation, only by displaying a telephone directory, telephone chooses automatically the partner whom a user is likely to telephone in the light of the utilization hysteresis of the past telephone at the current event, and outputs him. If it is the partner who has telephoned periodically especially, even if the utilization frequency is low, it will be automatically extracted as a telephone partner's candidate in the arrival time-of-day neighborhood of the period.

[0069] In addition, auto calling can be performed, without keying the numeric value of the telephone number concerned by making directions selection of the telephone number of the arbitration currently displayed also in this case. Moreover, the consecutive telephone number can be displayed by scrolling of an image. Although the same thing as what was shown in drawing 7 can be used for the individual humanity news with which it registers in this case, it should just have the telephone number at least as the communication link address.

[0070] As mentioned above, although the gestalt of suitable operation of this invention was explained, probably, it will be clear to this contractor that deformation is performed and various change can be made, without deviating from a claim.

[Translation done.]

* NOTICES *

JPO and NCIPI are not responsible for any
damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may
not reflect the original precisely.

2.**** shows the word which can not be translated.

3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing for explaining the mode of partial data
synchronization of the outline of the pocket mold information machines and
equipment in the gestalt of operation of this invention.
[Drawing 2] It is the block diagram showing the hardware configuration of the
outline of the pocket mold information machines and equipment which can
apply this invention.
[Drawing 3] It is the flow chart which shows the processing performed in
each at the time of the data communication between the pocket mold
information machines and equipment 10 and the servers 20 for partial data
synchronization of this invention.
[Drawing 4] It is drawing for explaining the new algorithm of the partial data
extraction in the gestalt of operation of this invention.
[Drawing 5] It is the flow chart of the management data update process in
the gestalt of operation of this invention.
[Drawing 6] It is the flow chart of extract processing of partial data.
[Drawing 7] It is the explanatory view showing the example of registration of
the individual humanity news managed in the gestalt of operation of this
invention.
[Drawing 8] It is the explanatory view of the example of a screen of the
display of the pocket mold information machines and equipment (PDA) in the
gestalt of operation of this invention.
[Drawing 9] It is the explanatory view of the example of a screen of the
display of the pocket mold information machines and equipment (telephone)
in the gestalt of operation of this invention.
[Description of Notations]
10 -- pocket mold information machines and equipment, 20 -- server, 21 --
storage, and 30 -- PC, 101 --CPU, 105 --ROM, and 107 -- a flash memory,
108 --RAM, the 109 -- calender IC, and 110 -- the infrared communications

control section, 122 -- flat-surfaces display, 131 -- various keys, and 133 --
the communications control section, the 134 --RF section, a 135 -- antenna,
and 136 -- a microphone, a 137 -- loudspeaker, and the 138 -- speech
processing section.

[Translation done.]